## REMARKS/ARGUMENTS

Claims 12-17 and 24-29 are pending in this Application. By this amendment, Applicant AMENDS claims 12-14 and 24-26 and the Abstract of the Disclosure.

The Examiner is reminded that in an Information Disclosure Statement filed on July 9, 2010, Applicant cited co-pending U.S. Patent Application No. 12/829,413 to bring to the attention of the Examiner and have the Examiner consider the subject matter and claims of the co-pending U.S. Patent Application, the prior art references, Office Actions, and Applicant's responses to the Office Actions made of record in the co-pending U.S. Patent Application. Applicant respectfully requests that the Examiner update his review and consideration of the claims of the co-pending U.S. Patent Application, the prior art references, Office Actions, and Applicant's responses to the Office Actions made of record in the co-pending U.S. Patent Application.

In § 3 on page 2 of the outstanding Office Action, the Examiner objected to the Abstract of the Disclosure for exceeding 150 words. The Abstract of the Disclosure has been amended to include less than 150 words. Accordingly, Applicant respectfully requests reconsideration and withdrawal of this objection.

In § 4 on page 3 of the Office Action, the Examiner explained that he has interpreted "essentially comprising" as "comprising," and in § 5 on page 3 of the Office Action, the Examiner explained that "composed of" can be interpreted as "consisting of" or "consisting essentially of" and alleged that Applicant's use of "composed of," "essentially comprising," and "comprising" is unclear.

In § 7 on page 4 of the Office Action, the Examiner rejected claims 12-17 and 24-29 under 35 U.S.C. § 112, second paragraph, for allegedly being indefinite. Particularly, the Examiner alleged that the use of the terms "composed of," "essentially comprising," and "comprising" renders the claims indefinite. Applicant has amended claims 12-14 and 24-26 to recite "made of" instead of "composed of" and "consisting essentially of" instead of "essentially comprising."

Accordingly, Applicant respectfully submits that the claims are clear and definite, and respectfully requests reconsideration and withdrawal of this rejection.

In § 11 on page 5 of the outstanding Office Action, the Examiner rejected claims 12-17 and 24-29 under 35 U.S.C. § 103(a) as being unpatentable over Radzievskii et al. (Vacuum brazing of plate-rib heat exchangers) in view of Hasegawa et al. (EP 1 068 924 A1). Applicant notes that the Examiner has inadvertently failed to include claims 24-29 in the statement of the rejection since each of claims 24-29 are specifically addressed in the body of the rejection.

Applicant respectfully traverses the rejection of claims 12-17 and 24-29.

Applicant's claim 12 has been amended to recite:

> A brazing method for brazing a first member and a second member to be joined via a braze joint, the method comprising the steps of:
>
> preparing the first member and a brazing foil, the first member including a base plate made of a ferrous material and a diffusion suppressing layer laminated on the base plate for suppressing diffusion of Fe atoms into the braze joint from the base plate during the brazing, the diffusion suppressing layer being made of a Ni-Cr alloy consisting essentially of not less than about 15 mass% and not greater than about 40 mass% of Cr and the balance of Ni, **the brazing foil being made of a Cu-Ni alloy consisting essentially of not less than about 17 mass% and not greater than about 20 mass% of Ni and the balance of Cu**;
>
> assembling the first and second members into a temporary assembly with the brazing foil disposed between the diffusion suppressing layer of the first member and the second member;
>
> performing a brazing process by maintaining the temporary assembly at a brazing temperature of not less than about 1,200°C to fuse the brazing foil and diffuse Ni atoms and Cr atoms into the fused brazing foil from the diffusion suppressing layer to form the braze joint, **causing the resulting brazing material of the braze joint to have a higher melting point than the brazing temperature to self-solidify all of the brazing material of the braze joint, wherein the braze joint is free from segregated solidification and is made of a Cu-Ni-Cr alloy containing not less than about 34 mass% of Ni and not less than about 10 mass% of Cr**; and
>
> cooling the resulting assembly. (emphasis added)

Applicant's claim 24 recites features that are similar to the above emphasized features recited in Applicant's claim 12.

In § 11 on pages 5 and 6 of the outstanding Office Action, the Examiner alleged that the combination of Radzievskii et al. and Hasegawa et al. teaches the features recited in Applicant's claims 12 and 24. In the second full paragraph on page 6 of the outstanding Office Action, the Examiner alleged:

> It would have been obvious to one of ordinary skill in the art at the time of the invention to place the laminated Ni-30wt%Cr diffusion barrier layer of Hasegawa between the stainless steel and braze foil of Radzievskii in order to prevent deterioration in the braze joint. Furthermore, since the prior art method is identical to that claimed it is the examiner's position that the claimed result is accomplished.

Applicant respectfully disagrees.

First, contrary to the Examiner's allegations, both Hasegawa et al. and Radzievskii et al. fail to teach or suggest the features of the brazing process including "causing the resulting brazing material of the braze joint to have a higher melting point than the brazing temperature to self-solidify all of the brazing material of the braze joint, wherein the braze joint is free from segregated solidification and is made of a Cu-Ni-Cr alloy containing not less than about 34 mass% of Ni and not less than about 10 mass% of Cr" as recited in Applicant's claims 12 and 24. In fact, Hasegawa et al. specifically teaches away from the present claimed invention for the following reasons.

Paragraph [0005] of Hasegawa et al. states, "Furthermore, even when use is made of Cu-Ni brazing filler alloys to which comparatively much nickel which is an element that enhances corrosion resistance has been added, adequate corrosion resistance is not realized. It is an observed effect, moreover, that corrosion resistance deteriorates as the nickel content becomes higher." Paragraph [0034] of Hasegawa et al. states, "Next, in order to investigate brazing filler metal layer corrosion resistance in the embodied composites after heating, brazing filler metals were prepared of pure copper, Cu - 10 wt% Ni alloy, Cu - 20 wt% Ni alloy, and Cu - 30 wt% Ni alloy, and the corrosion resistance was investigated by conducting corrosion tests." The above-described brazing filler metal layer, which after heating that simulates brazing, corresponds to the "brazing filler metal section after brazing" discussed in paragraph [0029] of

Hasegawa et al. and corresponds the braze joint as recited in Applicant's claims 12 and 24. Paragraph [0036] of Hasegawa et al. states, "It is apparent from Fig. 7 that optimal corrosion resistance is realized when the nickel content ranges from 15 to 25 % or so." In particular, Fig. 7 of Hasegawa et al. shows that, when nickel content is over about 30 wt%, corrosion resistance deteriorates.

The reason that the corrosion resistance of the brazing filler metal layer having over about 30 wt% of nickel after brazing deteriorates is that the brazing filler metal layer after brazing, i.e., the brazing filler metal section, does not self-solidify. As described in paragraph [0009] of Applicant's substitute specification, a self-solidified metal is free from dendrites and, accordingly, free from segregated solidification. Dendrites and segregated solidification cause the corrosion resistance of the braze joint to deteriorate as described in paragraph [0007] of Applicant's substitute specification. Thus, the self-solidified high nickel alloy has excellent corrosion resistance, and this is a reason why, in the present claimed invention, although the nickel content of the braze joint is not less than about 34 mass% of nickel, the braze joint in Applicant's claimed invention has excellent corrosion resistance.

Thus, contrary to the Examiner's allegations, Hasegawa et al. fails to teach or suggest a brazing process to produce the self-solidified braze joint that is free from segregated solidification and made of a Cu-Ni-Cr alloy having not less than about 34 mass% of nickel, and certainly fails to teach or suggest the feature of "causing the resulting brazing material of the braze joint to have a higher melting point than the brazing temperature to self-solidify all of the brazing material of the braze joint, wherein the braze joint is free from segregated solidification and is made of a Cu-Ni-Cr alloy containing not less than about 34 mass% of Ni and not less than about 10 mass% of Cr" as recited in Applicant's claims 12 and 24.

In fact, Hasegawa et al. clearly teaches away from the brazing process recited in Applicant's Claims 12 and 23 because Hasegawa et al. specifically teaches that, in order to prevent deteriorated corrosion resistance, the nickel content of the brazing filler metal section after brazing must <u>**not**</u> be over 30 wt%.

A reference is said to teach away when a person of ordinary skill, upon reading the

reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that the applicant took. *In re Gurley*, 27 F.3d 551, 31 USPQ 2d 1130, 1131 (Fed. Cir. 1994). The Examiner is reminded that it is error to find obviousness where references diverge and teach away from the invention at hand. *W.L. Gore & Assoc. v. Garlock Inc.*, 220 USPQ 303, 311 (Fed. Cir. 1983).

Thus, the combination of Radzievskii et al. and Hasegawa et al. clearly fails to teach or suggest the feature of “causing the resulting brazing material of the braze joint to have a higher melting point than the brazing temperature to self-solidify all of the brazing material of the braze joint, wherein the braze joint is free from segregated solidification and is made of a Cu-Ni-Cr alloy containing not less than about 34 mass% of Ni and not less than about 10 mass% of Cr” as recited in Applicant’s claims 12 and 24.

Second, Hasegawa et al. specifically teaches that a brazing foil or brazing material layer (before brazing) made of a Cu-Ni brazing alloy must **not** include more than 10 wt% of nickel to make the brazing filler metal section after brazing, which corresponds to the braze joint in Applicant’s claims, have enhanced or improved corrosion resistance.

As discussed above, Hasegawa et al. discloses that the corrosion resistance of the brazing filler metal layer having over about 30 wt% of nickel after heating deteriorates. Paragraph [0030] of Hasegawa et al. states: “The corrosion resistance was studied using the brazing composites relating to Embodiments 1 to 5.” Paragraph [0031] of Hasegawa et al. discloses that each brazing composite of Embodiments 1 to 5 has a brazing filler metal layer (before heating) made of a Cu-Ni alloy containing 0 wt% to 20 wt% of nickel. The brazing composite of Embodiment 5 has the brazing filler metal layer (before heating) made of Cu – 20 wt% nickel alloy. Paragraph [0032] of Hasegawa et al. discloses that the brazing composites were heated in a manner to simulate brazing under various heating conditions as shown in Study Nos. 1-5. Study No. 5 for Embodiment 5 was heated at a temperature under 1200 °C for 10 min. After heating, the brazing filler metal layer in Study No. 5 had a nickel content of about 30 wt%, as described in paragraph [0033] and Fig. 6. Paragraph [0034] of Hasegawa et al. discloses that a corrosion test was performed for prepared Cu-Ni alloys corresponding to the

Cu-Ni alloys used for the brazing filler metal layers after heating. Paragraph [0036] and Fig. 7 of Hasegawa et al. discloses the results of the corrosion test. Paragraph [0036] of Hasegawa et al. states, "It is apparent from Fig. 7 that optimal corrosion resistance is realized when the nickel content ranges from 15 to 25 wt% or so." As described above, Hasegawa et al. excludes the brazing filler metal layer made of Cu - 20 wt% Ni alloy before heating to enhance or improve corrosion resistance because the brazing filler metal layer made of Cu - 20 wt% Ni alloy produces a brazing filler metal layer, as described in Study No. 5, that has nickel content of about 30 wt%.

Further, paragraph [0029] of Hasegawa et al. states:

> By making the nickel content in the Cu-Ni alloy from 5 to 10 wt%, ..., whereupon the nickel content of the brazing filler metal section after brazing will be on the order of 10 to 25 wt%. Brazing filler metal section that consists of this Cu-Ni alloy will excel in corrosion resistance, and can therefore exhibit outstanding corrosion resistance even against exhaust gas condensates.

Thus, Hasegawa et al. specifically discloses that the nickel content of the brazing filler metal (before brazing) must **not** be greater than 10 wt% of nickel to produce a brazing filler metal section after brazing, i.e., braze joint recited in Applicant's claims, having enhanced or improved corrosion resistance, and clearly excludes and teaches away from using a brazing filler metal before brazing containing over 10 wt% of nickel, such as the Cu-Ni brazing alloy of MN19 disclosed in Radzievskii et al. Therefore, contrary to the Examiner's allegations, no one of ordinary skill in the art would have combined the alleged teachings of Hasegawa et al. with Radzievskii et al.

Further, there would have been no rational or technical reason to introduce a Fe atom diffusion suppression layer of the brazing composite disclosed in Hasegawa et al. into a covering material of stainless steel for PRHE described in Radzievskii et al. which is brazed with a Cu-Ni brazing alloy of MN19 containing 18-20 % of nickel, because the brazing composite of Hasegawa et al. excludes using the brazing filler metal of the Cu-Ni brazing alloy containing over 10 wt% of nickel to enhance or improve corrosion resistance of the brazing filler metal section after brazing, which corresponds to the braze joint recited in Applicant's claims 12 and 24.

Therefore, the Examiner allegations on page 6, lines 9-12 of the outstanding Office Action that “[i]t would have been obvious to one of ordinary skill in the art at the time of the invention to place the laminated Ni-30 wt% Cr diffusion barrier later of Hasegawa between the stainless steel and braze foil of Radzievskii in order to prevent deterioration in the braze joint,” and on page 7, lines 6-8 of the outstanding Office Action that “[i]t would have been obvious to one of ordinary skill in the art at the time of the invention to place the laminated Ni-30 wt% Cr diffusion barrier later onto each side of the members to be brazed in order to prevent the brazed joint from deteriorating” are clearly incorrect and directly contrary to the clear and specific teachings of Hasegawa et al. described above.

Furthermore, the Examiner states on page 6, lines 12-13 of the outstanding Office Action, following the statement quoted above, “Furthermore, since the prior art method is identical to that claimed it is the examiner’s position that the claimed result is accomplished.”

However, the Examiner’s statement is incorrect and unsupported by any evidence of record, because the Examiner has failed to refer to any method step other than the brazing temperature at 1200 °C in Radzievskii et al., and because the Examiner has failed to consider that in Hasegawa et al.’s invention, the brazing conditions, which includes not only the brazing temperature and its holding time but also each of the nickel content of the brazing filler metal and the Fe atom diffusion suppression layer, excludes the cases in which the nickel content of the brazing filler metal section (i.e., braze joint as recited in Applicant’s claims) is greater than 25 wt% in view of enhancing or improving corrosion resistance for the reasons described above. In actuality, the corrosion resistance of the brazing filler metal section including 30 wt% of nickel in Study No. 5 of Hasegawa et al. (using the brazing filler metal made of Cu-Ni alloy of 20 wt% of nickel before heating and submitting to heating under 1200 °C for 10 min) deteriorates as described above. The reason that the corrosion resistance deteriorates is that the brazing filler metal section including 30 wt% of nickel is not self-solidified under the heating condition. This reason is easily confirmed by the liquidus projection for Cr-Cu-Ni ternary alloys, which was included with the Amendment filed on November 17, 2009.

Thus, contrary to the Examiner's allegations, the prior art method is, not only not identical to the methods recited in Applicant's claims 12 and 24, but is, in fact, quite different the methods recited in Applicant's claims 12 and 24. Thus, the Examiner's position that the claimed result is accomplished by the prior art is clearly and completely unsupported by any evidence of record.

Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection of claims 12 and 24 under 35 U.S.C. § 103(a) as being unpatentable over Radzievskii et al. in view of Hasegawa et al.

Accordingly, Applicant respectfully submits that the prior art of record, applied alone or in combination, fails to teach or suggest the unique combination of method steps recited in Applicant's claims 12 and 24 of the present application. Claims 13-17 and 25-29 depend upon claims 12 and 24 and are therefore allowable for at least the reasons that claims 12 and 24 are allowable.

In view of the foregoing remarks and amendments, Applicant respectfully submits that this application is in condition for allowance. Favorable consideration and prompt allowance are solicited.

The Commissioner is authorized to charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-1353.

Respectfully submitted,

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